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(FOUO 7/80)

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8 April 1980

# USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

(FOUO 7/80)



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USSR REPORT  
ELECTRONICS AND ELECTRICAL ENGINEERING  
(FOUO 7/80)

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ELECTROACOUSTICS

UDC 534.6:53.089.68

AUDIO-NOISE INSTRUMENTATION AND PRECISE ACOUSTIC MEASUREMENTS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 2, 1980 pp 48-49

[Article by D.Z. Lopashev]

[Text] Considerable attention was devoted to audio-noise metering and the development of a reference standard base for the nation in this field in the decree of the USSR Council of Ministers "On Measures to Reduce Noise at Industrial Enterprises and in Cities and Other Populated Points", adopted in 1973 [1].

In light of this, questions of the production of noise metering instruments, noise protection equipment, strengthening scientific research, expanding the network of testing stations for state certification of noise meters, measurement microphones and other noise measurement equipment, as well as conducting state tests of new metering instruments are all of considerable importance.

At the present time, the volume of noise measurements being performed on machines and mechanisms, and household equipment in anechoic and reverberation chambers, as well as under natural conditions, has increased. Several types of noise meters, measurement amplifiers, filters and measurement microphones are being produced for these kinds of measurements. Complete equipment sets are being supplied.

The development and implementation of state standards for noise norms for industrial products, from household equipment to means of transportation and the equipment of enterprises, has in turn required the accelerated construction of sound measurement chambers at enterprises. In responding to the requests of industry for the certification of sound measurement chambers, the requisite equipment and test procedures for the testing have been developed at the VNIIFTRI [All-Union Scientific Research Institute for Physicotechnical and Radio Engineering Measurements]. The IOSh-IA aerodynamic masterreference noise source which was developed is being series produced [2].

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A group of specialists was trained to certify sound measurement chambers with complete sets of measurement instruments; it has visited many of the nation's cities and certified anechoic and reverberation chambers, in which the noise of machines and sets of reference units is measured at plants producing noise measurement equipment, as well as in the laboratories of the state and departmental inspectorates. The work which has been done has made it possible to obtain comparative noise measurement results for products at various enterprises. The precision of the measurements has increased, and correspondingly, the expenses related to rejects have fallen off.

In accordance with the existing standards [3], it is permissible to measure the noise of machines by means of comparing it to the noise radiated by reference machines of the same type under shop conditions without using expensive sound measurement chambers. In this case, the machines used as the master references are: refrigerators, electric motors and others, they should be certified beforehand, and the sound power level radiated by them should be measured. Such measurements are performed at the VNIIFTRI on sample installations using anechoic and reverberation chambers, as well as high precision measurement channels with recording of the measurement results.

To satisfy the needs of industrial enterprises for testing of sound absorbing materials, the fiberglass wedges which are used to line anechoic chambers, an acoustic interferometer has been designed at the VNIIFTRI, with which samples having dimensions of 40 x 40 cm are tested. Moreover, three types of units were designed for the measurement of sound insulation under laboratory and natural conditions [2]. They make it possible to measure local insulation against air noise of samples with dimensions 50 x 50 cm and more, as well as the components of buildings, windows, doors, ceilings, etc. A method has been developed for graduating these units and determining the corrections for the readings in different frequency bands. For this purpose, samples of nonporous rubber are used, the sound insulation of which is computed with sufficient precision based on the "law of masses".

In providing of the national economy with reference measurement equipment has improved. Reference acoustic measurement equipment is used both in the state and in departmental metrological services. In recent years, new proof of performance acoustic laboratories have been set up, which are equipped with the KOS-I units developed at the VNIIFTRI [4].

A whole series of reference equipment has been designed for the performance of state tests on new noise measurement instruments at the VNIIFTRI. They make it possible to measure the frequency, time and amplitude electro-acoustical characteristics, and directional characteristics of sound sources and receivers, as well as electrical characteristics.

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Mechanical and climatic tests are also performed. These units make it possible to perform the requisite measurements during the development of new standard measurement microphones and noise meters.

At the present time, the verification test configuration for sound pressure measurement equipment in an air medium [5] in a frequency range from 2 Hz up to 100 KHz is provided by a primary state reference standard for units of sound pressure in an air medium, by working reference standards over the same frequency range, designed at the VNIIFTRI, approved in 1979, as well as by reference measurement equipment.

Further scientific research and improvement of the master standards and reference equipment are being carried out. An original reference unit of high precision has been designed for the extended range of 0.1 Hz to 200 KHz, and work is underway on further extending the range in the direction of infrasonic frequencies.

The refinement of standards, increasing their precision and improving the margin of precision in the standards with respect to reference standard measurement equipment, will make it possible to introduce yet another category in the verification test configuration for sound pressure measurement equipment in an air medium [4]. This will make it possible to use calibration standard microphones as the working calibration standards, rather than instrumentation employing the reciprocity method, as at the present time, something which will simplify the certification of the KOS-I units for verification testing laboratories, as well as their periodic certification every five years. Only sufficient sensitivity stability is required from the calibration standard microphones.

Audio-noise instrumentation is closely tied to its metrological support. For this reason, when developing new working measurement equipment, the possibilities for testing it with existing reference equipment, making provisions for the appropriate connecting dimensions and shapes of the receiving elements, something which still does not always occur, are all to be taken into account. Considerable attention has been devoted in recent years to standardization in the field of acoustic measurements.

The coordination of the requirements measurement methods placed on the characteristics of acoustic measurement instruments and the providing for compatible operation of measurement instruments, as well as with the capability for testing them on existing reference equipment can be assured only within the framework of comprehensive standardization. For this reason, the following are included in the planned new step of reviewing the existing standards on acoustics: noise measurement methods [5] using audio-noise meters [6], filters [7], etc., and their referencing to the new CEMA standards; it is expedient to devote particular attention to the coordination of the standards with each other, something which can be accomplished, for example, with the creation of the "System of Standards

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for Acoustic Measurement Methods and Equipment", in which three to four of the tens of standards will be included, taking standardized terminology into account.

It can be concluded in summing up that audio-noise instrumentation and precise acoustic measurements are stimulating a mutual development in the nation.

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PUBLICATIONS

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ANALOG AND DIGITAL INTEGRATED CIRCUITS

Moscow ANALOGOVYYE I TSIFROVYYE INTEGRAL'NYYE SKHEMY [Analog and Digital Integrated Circuits] in Russian 1979 signed to press 5 Apr 79 pp 2, 334-345

[Annotation and table of contents from the book by Sergey Viktorovich Yakubovskiy, Nikolay Arsen'yevich Barkanov, Boris Petrovich Kudryashov, Lev Ionovich Nissel'son, Mikhail Nikoforovich Topeshkin, and Lyubov' Petrovna Chebotareva, Sovetskoye radio, 68,000 copies, 336 pages]

[Text] The authors survey the nomenclature of the main series of analog and digital integrated circuits manufactured by the electronic industry. They describe the methods of their manufacturing, parameters and characteristics as well as the operating principles of basic elements. Tendencies in the development of logical circuits are shown. Factors affecting the reliability of integrated circuits are explained, special characteristics of the use of integrated circuits in designing radio electronic equipment are described, and recommendations for preventing failures of integrated circuits under various external influences and technological operations are given.

The book will be useful to engineers working in the area of designing radio electronic equipment who are interested in the problems of the selection of elements of integrated circuits and the peculiarities of their use, as well as to students of related specialities.

Table -- 73, figures -- 186, bibliography -- 64 items.

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PUBLICATIONS

ASSEMBLY SHOP OPERATIONS IN ELECTROVACUUM PRODUCTION

Moscow SBOROCHNYYE OPERATSII V ELEKTROVAKUUMNOM PROIZVODSTVE Second Edition in Russian 1979 signed to press 26 Feb 79 pp 2, 302-304

[Title, annotation, and chapter headings from a book by Valentin Aleksandrovich Varlanov and Yefim Il'ich Shekhmeyster, Vysshaya Shkola, 5000 copies, 304 pages]

[Text] Concise information is given on the design of the basic components of electrovacuum devices, their manufacturing technology, and physical-chemical processing and checking.

Consideration is given to the modern technology for assembly of interior components, welding of glass-metal bonds, vacuum handling, beading, and activation of the cathodes of different electron devices.

In the second edition of this book some of the chapters have been rewritten, the material has been partially rearranged, the descriptions of obsolete methods and equipment have been eliminated, and new examples are given.

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UDC 537.311.33

TRANSPORT PHENOMENA IN THIN SEMICONDUCTOR FILMS

Novosibirsk YAVLENIYA PERENOSA V POLUPROVODNIKOVYKH PLENKAKH (Transport Phenomena in Thin Semiconductor Films) in Russian 1979 signed to press 14 Feb 79 pp 2, 253-255

[Title, annotation, and table of contents from a book by Aleksandr Filipovich Kravchenko, Vladimir Vasil'yevich Mitin and Ernst Mikhaylovich Skok, Nauka, 2100 copies, 256 pages]

[Text] The monograph describes the theory of size effects in thin semiconductor films, i.e., the thickness dependence of the specific conductivity, magnetoresistance, thermal emf, and the other kinetic coefficients. This dependence occurs when the thickness of the film becomes comparable to some characteristic of the length (recombination, cooling, intervalley scattering, mean free path, Debye, de Broglie, etc.). These effects are described in films with size inhomogeneities. The effect of mechanical stresses in a film-substrate system and the effect of the surface state on the transport phenomena are analyzed. Experiments involving thin semiconductor films are discussed in detail. Methods for determining the film parameters are described, i.e., the characteristic of the lengths, mechanical stresses, relaxation rates on the surface, mobility distribution, concentration in films with thickness inhomogeneities, etc.

This book is designed for scientists, physical engineers, and technologists working in microelectronics, and also for undergraduate and graduate students in solid state physics.

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PUBLICATIONS

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ELECTRONIC DIGITAL GENERATORS OF SIGNALS OF TELEVISION IMAGES

Moscow ELEKTRONNO-TSIFROVYYE GENERATORY SIGNALOV TELEVIZIONNYKH IZOBRAZHENIY  
[Electronic Digital Generators of Signals of Television Images] in Russian  
1979 signed to press 4 Dec 1978 p 2

[Annotation of table of contents from the book by Kiril Ivanov Konov,  
Svyaz', 7000 copies, 105 pages]

[Text] The book examines the principles of the construction of digital generators of image signals intended for the formation of television testing signals, symbols, letters, digits, and tilters which are used in television technology and in systems of television computer automation. It describes various methods of designing image generators and gives typical circuits and examples of the realization of generators of symbols and basic testing images.

The book is intended for engineers and technicians working in the area of the development and designing of television devices of images of letter and digital information.

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PUBLICATIONS

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OPTIMIZATION OF ASYNCHRONOUS ADDRESSING RADIO COMMUNICATION SYSTEMS

Moscow OPTIMIZATSIYA ASINKHRONNYKH ADRESNYKH SISTEM RADIOSVYAZI [Optimization of Asynchronous Addressing Radio Communication Systems] in Russian 1979 signed to press 7 Aug 79 pp 2, 214-216

[Annotation and table of contents from the book by Mikhail Semenovich Yarlykov and Mikhail Vladimirovich Chernyakov, Svyaz', 2600 copies, 216 pages]

[Text] This book contains a systematic presentation of the structural principles and optimization of structures of asynchronous addressing communication systems and evaluation of their potential noise immunity depending on their purpose and area of application. Markov's methods of the theory of optimal nonlinear filtration are used for synthesizing devices for optimal processing of analog and digital signals, and their accuracy and noise immunity are analyzed. The authors give recommendations for practical design and use of asynchronous addressing communication systems.

The book is intended for scientists.

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PUBLICATIONS

SEMICONDUCTOR INTEGRATED MEMORY CIRCUITS EMPLOYING BIPOLAR TRANSISTOR STRUCTURES

Moscow POLUPROVODNIKOVYYE INTEGRAL'NYYE SKHEMY PAMYATI NA BIPOLYARNYKH TRANZISTORNYKH STRUKTURAKH in Russian 1979 signed to press 1 Dec 78 pp 2, 295-296

[Annotation and table of contents from book by Kamil' Akhmetovich Valiyev and Aleksandr Aleksandrovich Orlikovskiy, Izdatel'stvo Sovetskoye Radio, 296 pages]

[Text] A discussion is presented of the structural and technological aspects, the circuitry and questions relating to the designing of semiconductor integrated memory circuits employing bipolar transistor structures. The key principles are discussed, of designing and selecting the operating conditions of integrated storage devices and of circuits for controlling them. The prospects are discussed, of further increasing the capacity and improving the operating speed of bipolar integrated memory circuits.

This book is intended for engineers, students and graduate students specializing in the field of microelectronics.

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THEORY OF INFORMATION AND SIGNAL TRANSMISSION

Moscow TEORIYA INFORMATSII I PEREDACHI SIGNALOV [Theory of Information and Signal Transmission] in Russian 1979 signed to press 16 Apr 79 pp 2, 276-278

[Annotation and table of contents from the book by Vladimir Alekseyevich Ignatov, Sovetskoye radio, 15,000 copies, 280 pages]

[Text] The author presents a systematic explanation of the main principles of the theory of information and signal transmission and gives a general characteristic of the problems of this theory. He gives methods of mathematical description of information, signals, interference, and communication channels, methods of controlling informational parameters of signals, informational characteristics of information sources, signals, interference, and channels, interference stability of the transmission of discrete and continuous information, and correcting coding. Principles of the multiplexing of communication lines, evaluation and improvement of the effectiveness of information transmission, and special characteristics of controlling the information flow in the networks are examined. Each section has questions for testing, conclusions, and numerical examples contributing to a better assimilation of the material.

This book is a textbook for students of radio engineering departments of higher educational institutions of civil aviation. It can be used by students of other higher educational institutions and specialists in the area of telecommunication, technical cybernetics, and computer technology.

Tables -- 10, figures -- 66, bibliography -- 18 items.

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